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# Integrating Fire With Land Management Planning and Action—A Process

by Dr. Richard J. Barney

Adapted from a paper presented at the Joint Rocky Mountain Fire Council and Intermountain Fire Research Council Meeting, Rangeland Management and Fire, Casper, Wyoming, November 1, 2, 3, 1977.

## Introduction

It has long been an axiom of forest management that, to be managed, a forest must be protected. Hence, land management agencies have built a strong fire control program. As stated by Graves in 1910: "The first measure necessary for the successful practice of forestry is protection from forest fires." Fire is an integral part of the natural forces that shape the land and its resources, and hence, fire management and land management planning cannot be separated. They are synergistic in their relationships. Forest Service Chief, John McGuire (1975) said: "Fire management cannot be separated from total forest management. It must always be considered in land use planning . . . fire management must be included in our land use plans. I view fire as an equal environmental component—along with soil, air, water, land, and life forms . . . Fire managers must constantly insure that fire is considered an equal component in forest ecology. . . ." This paper outlines one approach merging fire management and land management in an orderly, flexible manner. Properly executed, this technique will reveal both the beneficial and harmful consequences of fire in a forest ecosystem or resource unit.

## Planning in Review

To prevent misunderstanding, I want to review some general concepts relative to planning and fire management. All planning, regardless of its intent, has a similar pattern: (a) setting objectives, (b) identifying issues, (c) gathering information, (d) developing alternatives, (e) selecting a course of action, (f) feedback and final (adjusted) decision, and finally, (g) developing individual activity plants (Lyon 1977).

In addition to the general planning process, almost all governing agencies, whether they be Federal, State, or private, have various levels of planning. That is, for various administrative reasons, we may have very general plans and then move to more specific plans as we get closer to action on the ground. As an example, we can have Federal, State, county, city, and neighborhood planning. The difference at each level is the resolution, size of the planning area, and time allowed for execution.

I define fire management as follows: The Integrating of Fire-Related Biological, Ecological, Physical, and Technological Information into Land Management to Meet Desired Objectives (Barney 1975). One approach for blending fire management and planning is illustrated by figure 1. The upper portion of the diagram above the fire management block could be considered the objective formulation phase. It is at this point where land capabilities and use demands are assessed. Key values are identified, as well as their relationships to fire. Below the fire management block, the fire integration phase begins by assessing fire danger or hazard for the planning area. Included throughout this phase is the prediction of change relative to fire caused by any proposed management action or alternative. Fire management considers alternative strategies for fuel management, as well as necessary fire control and suppression activities. The assessment of benefits and damages resulting from any proposed action can feed back to reshape planning direction and emphasis or it can support the use decision made initially.

## Why Integrate Fire Management Into Planning?

Throughout time fire has influenced the formation or perpetuation of the various vegetative types that we manage today.

Therefore, we must consider fire in management actions that manipulate vegetation. If fire has an influence within the ecosystem being managed, then it should be considered and integrated into the planning process for that piece of land. Consideration of fire is also important to insure compatibility between adjacent planning unit.

Undesirable fires will occur in many of our ecosystems, and managers must prevent and suppress them. Fire may also be used as a management tool. To sum up, we must integrate fire into land management planning to determine the kind and amount of fire protection and use appropriate for our objectives and to coordinate management of adjacent units.

Some often overlooked points in integrating fire into planning are the legal requirements, expressed and implied, set forth by Congress. Congress has indicated that wildlands must be protected from fire, yet fire must be used to perpetuate and enhance our ecosystems (Barney 1976). These points were enumerated in the Organic Act that launched the Forest Service and in the National Forest Practices Act of 1976. Unless we integrate fire into the overall land planning process, we will not be able to determine either adverse or beneficial effects of fire. After all, it's not the fire that we are concerned with directly, but rather how fire affects productivity of the resources we are trying to manage. We are concerned with costs, losses, and an array of environmental considerations.

Fire must be considered early and throughout the planning process. Failure to do so can cause untenable and, often, embarrassing results. For example, unless we plan out fire management activities, how can we develop the costs of our management programs? Without good cost estimates, how can we decide the most promising approach to our objectives?

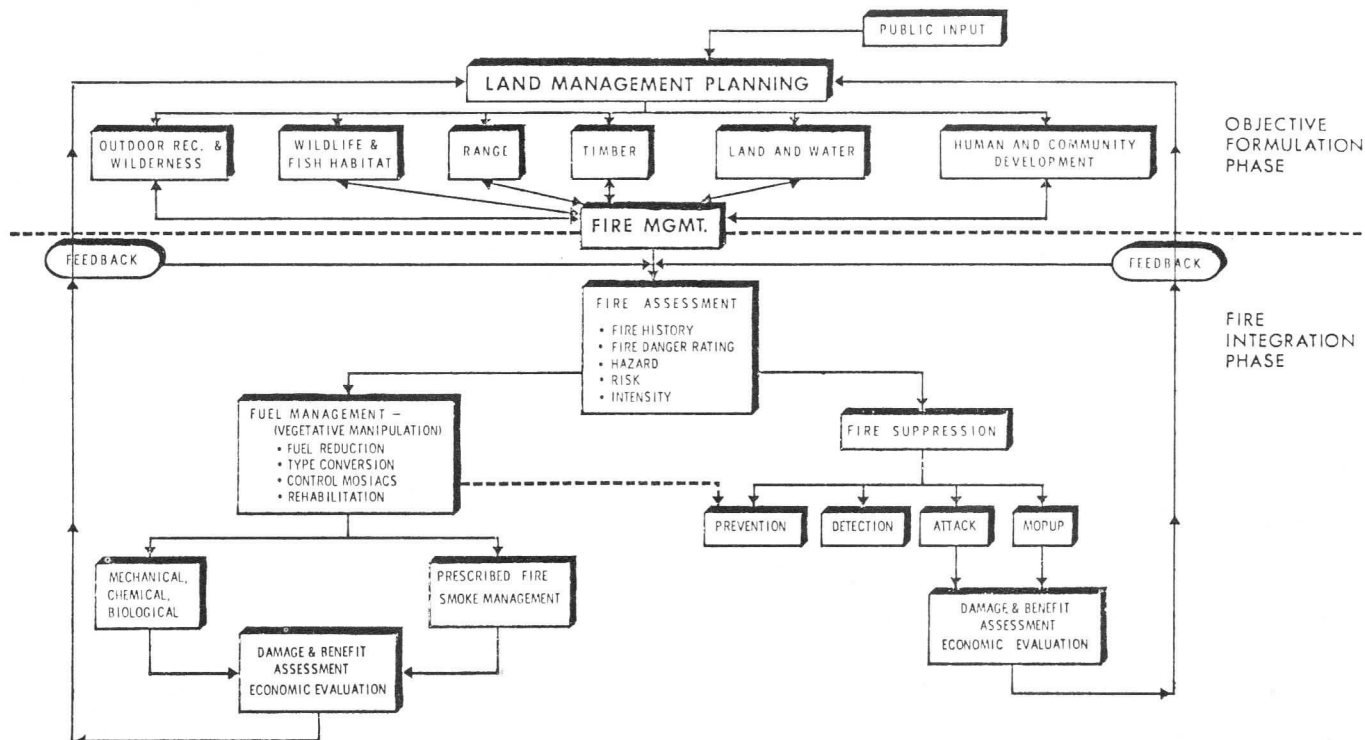


Figure 1.—Fire Management and Land Use Planning Relationships.<sup>3</sup>

<sup>3/</sup> U.S. Department of Agriculture, Forest Service. Fire in multiple use management, research, development, and applications program documentation. (Review draft.) Intermt. For. & Rge. Exp. Stn., Ogden, Utah, 91 p., 1975.

Fire is only one of many components that must be considered in the planning process. However, it is one component that can have dramatic effects on the overall success or failure of a plan. We must consider all important factors in our decisionmaking process relative to meeting land management objectives. Fire could be one of these.<sup>1</sup>

### What to Consider

Throughout the planning process, the manager must consider public demands, resource potential, and legal and dollar constraints.<sup>2</sup> Out of this process comes specific plans for meeting public needs and protecting the resource. The plan covers resource allocation and the quality, quantity, and timing of the management activities. Therefore, the manager must have funds to implement the plan. Management activities might include such things as timber harvesting, range improvement, road construction, or

vegetative type conversion. Plans might also include recreational use permits or merely information sign placement to encourage recreational use. The public use of consumption of resources will feed back to change the inputs to planning in the form of changed demand.

Forest and rangeland ecosystems are complex with interacting relationships. Attempting to develop a land management plan for these systems is, indeed, difficult. It is important to develop a perspective of the component parts and their interactions.

The system components include both physical and biological site factors. Physical factors include the geologic and physiographic properties of the area. The biological factors include the vegetation and wildlife resources of the area. The system modifiers are those components that impact or influence the area. They can be broken down by natural and cultural or man-induced factors. Weather, erosion, insects,

disease, and wildfire are some of the natural influences. These influences change the area over a relatively short period of time. Cultural impacts include such activities or actions as grazing, harvesting, and prescribed fire. It is at this level that fire enters the system. Fire is simply one of the many natural or cultural factors to be considered and accounted for in the process of balancing resource potential and resource demand. We must include both direct and indirect fire effects in the immediate and long-term range on natural and man-made components of the landscape and their effect on land use (Derman and Naveh 1977).

A key to including fire considerations in planning is to project the consequences of any proposed fire strategy in terms of its long-term and short-term consequences on the ecosystem.

Starting with the proposed fire strategy, we estimate fire behavior, fire effects, and finally, economic consequences. By doing this for

several iterations for several strategies, one strategy should evolve which meets the performance criteria established earlier in the planning process; and this one then can be implemented.

A fire management decision system model is illustrated in figure 2. This diagram shows the three phases of the system of fire behavior, fire effects, and economic evaluation. A fire behavior system begins with an inventory on site. Combining fuels information with topographic and weather information, models are developed to predict fire behavior. Fire behavior predictions can be in terms of fire intensity, duration, and rates of spread. The fire effects system then uses the fire behavior information to predict the impact of fire on resources within the area. This module is visualized as having two phases—prediction of primary effects and prediction of long-term responses. The primary effects can be divided into effects of fire on soils, vegetation, and air quality. These immediate, or primary, effects are

then used as inputs into an ecosystem production module. These primary fire effects are projected as to their long-term consequences on resource productivity. In a similar manner, these immediate effects must be looked at in terms of long-term environmental responses to fire. This would include such items as the offsite effects of water quality and air quality.

To complete the decision system, the long-term economic effects of fire must be evaluated. Changes in resource productivity must be evaluated in terms of increased or decreased human happiness. Environmental response must also be evaluated. Both of these, then, are combined in terms of how well they meet or exceed the performance criteria in the planning process. This evaluation, combined with implementation cost, provides a basis for comparing management strategies. The fire decision that is made in the planning process is to choose the most feasible strategy in meeting management objectives. This

strategy will most likely be some combination of fire prevention, fire suppression, and fire use.

The process I have reviewed can be mind boggling. There seem to be more boxes and arrows than our abilities to handle them. Such is really not the case. We now have the capability to help managers integrate fire into the planning process. Computerized simulation is one tool by which this can be accomplished. This is not an idea that is far off, but a technology that is available today. Indeed, refinements may be necessary to meet some of our specific current requirements. But the hardware, software, and know-how are here. The basic problem is defining our problems and needs. We have only to start using the tools available.

The need to consider fire in our management plans was recently emphasized by Dr. M. Rupert Cutler, Assistant Secretary of Agriculture (Cutler 1977). "There must be a link between land management planning and fire management planning. Land management planning is not complete

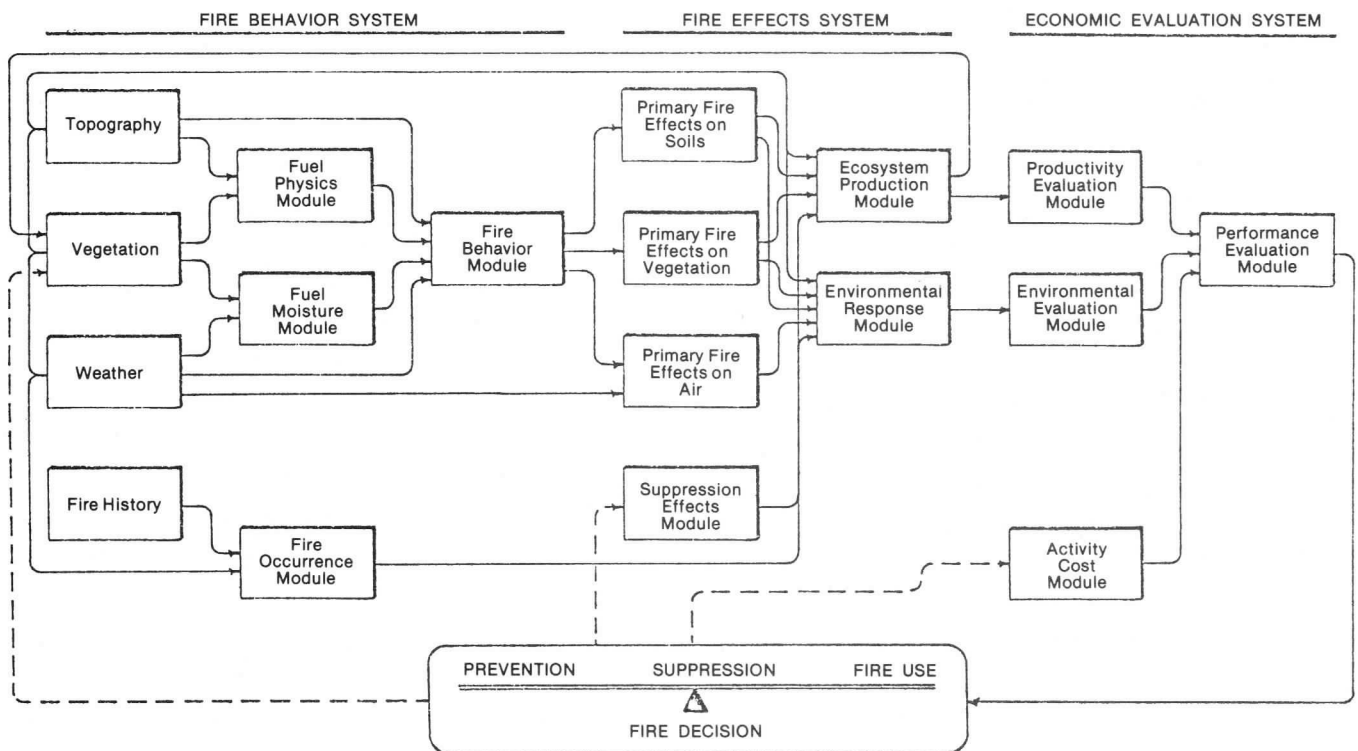


Figure 2.—Detailed Information Flow for a Fire Management Decision System.<sup>4</sup>

<sup>4</sup>/ Louis T. Egging. Integrating fire into the land management planning - A perspective. (In process.) USDA For. Serv., Intermt. For. & Rge. Exp. Stn., Ogden, Utah. 1978.

without the consideration of fire. This does not mean that fire has to be a major factor in every plan, but it should be considered. On the other hand, fire could be very important in protecting, modifying, or perpetuating the ecosystem. We must also assess the potential affect of planned management actions on the future fire situations. This must all be done on an interdisciplinary basis. Without interdisciplinary considerations, we haven't done our jobs as professional managers." We have defined a general procedure for incorporating fire into our planning. Managers are the key to the implementation.

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### Notes

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